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ABSTRACT

Cost-effectiveness analysis provides a useful tool for choosing between alternative desegregation plans or justifying one particular plan. Previous analyses of school desegregation effects on white enrollment, which focus only upon costs, have had limited use for policy. Traditional cost-benefit analysis poses problems because of the difficulty of attaching monetary values to policy alternatives and because the courts consider school desegregation a a goal in itself rather than just one of many alternatives leading to other goals. In cost-effectiveness analysis, the school desegregation goal may be identified as interracial exposure, and the analysis can proceed using (1) a measure of the extent of interracial exposure indicating the proportion of white students in the average black child's school; and (2) information on school racial composition after projected reassignments and after white flight. Analysis of proposals for the San Diego (California) Independent School District using this method indicated that the American Civil Liberties Union plan would maximize interracial exposure more than either the school district plan or the condition of no further desegregation. By varying the white flight values in analysis, as was done for the Port Arthur (Texas) Independent School District, the effects of white flight on the value of desegregation plans can be estimated. (Author/MJL)

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COST-EFFECTIVENESS ANALYSIS OF SCHOOL DESEGREGATION PLANS

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COST-EFFECTIVENESS ANALYSIS OF SCHOOL DESEGREGATION PLANS

Christine H. Rossell

Abstract

Cost-effectiveness analysis, a variation of benefit-cost analysis, is a way of determining which of several policy alternatives will maximize a given value or goal. This type of analysis can be used to evaluate alternative desegregation plans. The value to be maximized is interracial exposure. Although one of the central issues in school desegregation court cases is how much white flight will be produced by the various desegregation plans formulated by the defendants and the plaintiffs, almost no one attempts to assess its effect on the instrumental goal of interracial contact. It is possible to calculate the effectiveness of alternative plans using a formula that measures the proportion white in the average black (or minority) child's school after white flight and desegregation reassignments. The policymaker (typically a judge) then has information by which he or she can choose the alternative with the greatest net benefit.

COST-EFFECTIVENESS ANALYSIS OF SCHOOL DESEGREGATION PLANS

Introduction

Social science testimony has been used in school desegregation court cases since 1950 when it was introduced into Sweatt v. Painter, the Texas law school case which overturned the principle of "separate but equal" in higher education. Most of the social science testimony introduced into that and later cases to prove that blacks and white are inherently equal, that school segregation is harmful, and that school desegregation would not produce violence, was, however, the learned opinion of respected academicians rather than the findings of social science research.[1]

One major exception to this is the research on the impact of school desegregation on "white flight." Beginning in the late 1960's and accelerating after 1975 with Coleman, Kelly and Moore's national statistical analysis of school desegregation and white flight, scientific research on this subject has become an important part of the court testimony during the remedy stage of hearings. The vast majority of this research has utilized traditional social science techniques to make predictions regarding how much white flight could be expected from the plaintiffs' desegregation plan, a plan which is always more extensive than the defendant's.

The first and most common social science research method

used to make predictions has been multiple regression analysis. Equations derived from national statistical analyses of school desegregation and white enrollment change (see Coleman et al., 1975; and Rossell, 1978) are solved for the particular characteristics of the school district and desegregation plan. This yields an estimate of the extent of white flight that the plan is likely to produce, in addition to that caused by the characteristics of the school district (i.e. the "normal" white enrollment loss). Some researchers have also made such predictions from school loss rates for students actually reassigned in one school district (Rossell and Ross, 1979).

Another type of research has been conducted with demographic data. (See Armor, 1980.) In a school district about to undergo court ordered school desegregation, the normal loss rate if the district does not desegregate is projected from its past birthrates and outmigration rates. The loss predicted with the desegregation plan comes from the estimates of such losses in other school districts. The two are then compared to show the short and long term effect of desegregation.

Still another type of research introduced into court cases has consisted of white parental responses to sample surveys conducted prior to desegregation (see Armor and Ross, 1979). Estimates of the extent of white flight are made from the preferences and behavioral intentions of white parents.

While each type of research has its own particular flaws, a limitation they all share is that they only estimate the costs of desegregation, and typically only the costs of the plaintiffs'

plan. Yet, policy analysis which only estimates costs and ignores benefits is obviously inadequate analysis.

Cost-Effectiveness Analysis

Traditional benefit-cost analysis requires the following seven procedures: 1) identifying goals; 2) identifying decisionmakers and their values or those of society; 3) identifying policy alternatives; 4) determining the costs (program expenses or undesired effects) of each alternative; 5) determining the benefits of each alternative; 6) attaching monetary values to these costs and benefits, and "discounting" them if necessary; and 7) choosing the alternative with the greatest net benefit (benefits minus costs) considering social or decisionmakers' values and distributional effects.

There are many instances, however, where the costs and benefits of policy alternatives may be difficult, if not impossible, to value monetarily. First, many program effects are global in nature, and the willingness of citizens to pay for them is hard to value because it depends on salience, identifiability, and imperfect knowledge. Second, there are some losses for which individuals cannot be compensated, such as the loss of life. Third, some goals are viewed as constraints. That is to say, they must be achieved because those who advocate them believe that any situation in which their desired goal is achieved is better than any without it. Finally, program effects may be difficult to value where there is a good deal of uncertainty regarding relevant events.

In such cases, a policy analyst may produce more useful or more "accurate" results by adopting a cost-effectiveness strategy in which at least one dimension of the effect of alternative policies is to be valued by decisionmakers. Cost-effectiveness analysis is a method of evaluating decision alternatives by 1) making all effects commensurable in terms of either money or one unvalued output unit, and 2) by comparing these dimensions of impact (Thompson, 1980). Cost-effectiveness analysis can be a tool of formative evaluation -- determining the best way to achieve a program objective -- or summative evaluation -- determining whether a program is justified.

School Desegregation As a Constraint

Social scientists have identified four goals that school desegregation should achieve. These are 1) raising minority achievement so that the gap between the races is reduced and eventually eliminated, 2) achieving equal status interracial contact and friendships; 3) increasing minority self-esteem and motivation; and 4) increasing minority life chances. The courts, however, do not see these goals as being within their purview. It is up to school administrators to make school desegregation something other than the remedying of unconstitutional school segregation. For the courts, then, school desegregation <u>is</u> the goal, rather than the means of achieving other goals as social scientists view it. Indeed it is of no concern to the courts that a traditional benefit-cost analysis might indicate that the four goals outlined above

would be more efficiently achieved by other policies.

Given that school desegregation is a constraint, the results of traditional benefit-cost analysis would be of no use to the courts. Therefore, a policy analyst advising this decisionmaker would be more helpful if he or she analyzed alternative plans to determine which achieves the greatest degree of school desegregation rather than conducting a benefit-cost analysis in which school desegregation is only one of the alternatives. In order to do a cost-effectiveness analysis, however, there must be a consensus as to what school desegregation is.

Defining School Desegregation

The courts have proceeded incrementally in deciding what school desegregation is. In 1954 it was defined as the rescinding of segregation laws. Several court decisions after Brown v. Board of Education (1954) held, moreover, that the remedy for governmentally imposed segregation need not be governmentally imposed desegregation. Decisionmakers only had an obligation to discontinue their affirmative segregation, not to adopt another affirmative policy.

By contrast, in 1964 the Office of Civil Rights in HEW issued affirmative school desegregation guidelines for complying with the 1964 Civil Rights Act. These guidelines suggested specific yearly change in the proportion black attending white schools. HEW's measure of remaining segregation was the proportion of black students in schools greater than 90 percent black.[2]

In 1968, perhaps as a result of HEW's school desegregation

guidelines, the Supreme Court made an abrupt departure from their prior definition of segregation. In Green v. New Kent County, the Court ruled it was insufficient to discontinue enforcing segregation. School desegregation was now defined as whatever was necessary to produce schools which were not one-race. If a school district continued to have a substantial number of one-race schools, it had not desegregated its schools regardless of whether the laws had been changed, Emphasis was now on policy output, however crudely measured, rather than on inputs.

In 1971, the Supreme Court elaborated further on their 1968 precedent by stating in Swann v. Charlotte-Mecklenburg that school desegregation was racially balanced schools, and that this could be achieved by busing if necessary. Racially balanced schools were schools whose racial composition approximated the racial composition of the entire school district. Hence, if a school district was 50 percent white and 50 percent black, the schools in that district should be roughly 50 percent white and 50 percent black. Marginal deviations from this would be allowed for pedagogical or logistical reasons.

Social scientists have responded to these decisions by devising numerous measures of racial balance that would allow policymakers to assess the need for and the effect of a school desegregation plan. The dilemma for the policymaker seeking guidance, however, is that whereas the white flight analyses assess only the costs of school desegregation, the racial balance measures almost completely ignore them. Racial balance indices do not distinguish between 1) a desegregation plan in

which 99 percent of the whites have fled, but the remaining one percent are evenly distributed among schools (producing an index of 0), and 2) one in which none of the whites have fled and all are evenly distributed among schools (producing an index of 0).[3] The former situation has the same racial balance as the latter, but much less interracial exposure. Since virtually no one trying to achieve school desegregation would prefer the former to the latter, and courts have behaved as if they prefer the former to the latter, it seems reasonable to conclude that school desegregation is interracial exposure rather than simply racial balance.

Interracial exposure is, of course, a function of racial balance. If whites and blacks are evenly distributed among schools, there will be more interracial exposure than if each race goes to separate schools. Interracial exposure is also, however, a function of the proportion of whites and blacks in the school system -- the level of interracial exposure can be no higher than the proportion white in the school system -- and this is influenced by "white flight."

Calculating the Cost-Effectiveness of Desegregation Plans

Cost-effectiveness analysis usually involves calculating the ratio of the monetary cost to the unvalued benefit for various alternatives. This yields the per unit cost of each alternative. It can be used to decide which to choose or whether to do anything at all (depending on whether people are willing to pay the per unit cost of the cheapest program.)

Conducting such an analysis for school desegregation is of limited value since the courts are unwilling to consider monetary costs, and if school desegregation is really racial balance, would be unwilling to take into account "white flight" costs.

Since policymakes act to maximize interracial exposure, a single measure of the extent of interracial exposure would be of use to them. The measure is calculated as follows:

$$Sbw = \frac{\Sigma n_{kb} p_{kw}}{\Sigma n_{kb}}$$

where n_{kb} is the number of blacks in a particular school and p_{kw} is the proportion of whites in the same school.[4] This is summed for all schools and divided by the number of blacks in the school system to produce the prcportion white in the average black child's school. The proportion white in the average black child's school goes up with racial balancing reassignments, but goes down with white flight thus yielding the interracial exposure net benefit of alternative desegregation plans for the same school district.

In order to evaluate desegregation plans with this measure, two pieces of information are needed: the racial composition of every school after projected reassignments and after white flight. The former information comes from the designers of each plan; the latter from social science research.

Cost-effectiveness analysis of desegregation plans was first used in spring 1979 in Carlin v. San Diego Unified School District to determine whether to revise the voluntary school desegregation plan approved by the San Diego Superior Court and implemented in

Fall 1977. I used multiple regression equations derived from my 113 school district study covering the time period Fall 1963 to Fall 1975 (Rossell, 1978) to predict how much white flight would result in Fall 1979 (the third year of the plan) from 1) no further desegregation, 2) the San Diego Unified School District's proposed extension of their voluntary plan which was to result in 2.37 percent of the black students and .51 percent of the white students volunteering for integrated schools and a 2.60 percentage point reduction in racial imbalance as measured by the index of dissimilarity;[5] 3) the desegregation plan I proposed for the ACLU which was to result in 25 percent of the black students and 10 percent of the white students mandatorily reassigned and a 30 percentage point reduction in racial imbalance.

The equation is in Appendix 1 and its results in Table 1. It indicates that no further desegregation would produce a white loss rate of 4.8 percent and a white enrollment of 67,705 in Fall 1979, the school district's plan would produce a loss rate of 6.0 percent for a Fall 1979 white enrollment of 66,852, while the ACLU's plan would produce a loss rate of 8.4 percent and a white enrollment of 65,145. If the costs of school desegregation were the only consideration, then no desegregation at all would be the preferred choice.

[Table 1 about here]

One type of cost-effectiveness measure can be calculated as the ratio of the marginal decline in white enrollment to the marginal decline in racial imbalance. The results of this

analysis, shown in Table 2, indicate that the school district's plan has a cost-effectiveness ratio of .44, almost four times as costly as the ACLU's plan which has a ratio of .12. If racial balance were the goal of school desegregation and minimizing costs were an important consideration, the rational decisionmaker would choose the ACLU's plan over that of the district. Whether this is more rational than doing nothing, which has no costs but also no benefits, is a function of whether society or the decisionmaker is willing to pay the "price" of the most cost-effective plan.

[Table 2 about here]

As indicated above, however, the courts have claimed they are not able to take costs into account in this manner, but instead act to maximize interracial contact. Accordingly, equations derived from the same research were then used to estimate the long term interracial exposure of each plan five years after their proposed implementation (Fall 1983).

The equation is in Appendix 1 and its results in Table 3. These data indicate that if the San Diego School District had not implemented its court approved voluntary magnet school plan in Fall 1977, it would have a predicted Sbw of .252, or 25.2 percent white in the average black child's school. Alternative 3, the school district's proposed extension is predicted to produce an Sbw of 27.1 percent white in the average black child's school, only slightly better than if the school district did nothing further. Alternative 4, the ACLU's plan is predicted

to produce 36 percent white in the average black child's school in 1983. If the decisionmaker's goal is to maximize interracial exposure, and he or she trusts the equations, then alternative 4 is the rational choice.

[Table 3 about here]

Sensitivity Analysis

The equations used to calculate the amount of white flight and interracial exposure for different desegregation plans, as indicated above, are based on the impact of desegregation plans implemented from 1963 to 1975, although those with mandatory white reassignments generally occurred between 1970 and 1975. By 1981, these equations would then be based on empirical observations anywhere from five to 15 years old. Given the volatility of white locational and school choices, and the curvilinear nature of the white birthrate which peaked in 1968, these equations become increasingly less externally valid over time.

Fortunately, it is not necessary to use these equations to make predictions. An alternative is to systematically vary the white flight parameters to observe their effect on the value of desegregation plans. I did this kind of sensitivity analysis in U.S. v. Texas Education Agency (Port Arthur Independent School District)(1980) by estimating the effect on interracial exposure of no, minimum, mean, and maximum white flight observed in other school districts with desegregation reassignments similar to those proposed in each plan.

The results of this analysis are shown in Table 4. Columns

1 and 2 indicate the level of racial imbalance (Db) and interracial exposure (Sbw) of black and white students in Fall 1980, the year before the proposed desegregation. Column 3 has the level of racial imbalance under the proposed Port Arthur Independent School District (PAISD) plan assuming they meet their projections and experience no desegregation related white flight. Since 100 is perfect racial imbalance, the projected 63.7 figure for the PAISD plan will leave the school system relatively imbalanced. Column 4 contains the level of interracial exposure , 19.9 percent white in the average black child's school, that would be achieved under the PAISD plan assuming they meet their projections and have no white flight. This can be compared to the maximum level of interracial exposure that could be obtained for Fall 1981 -- 33 percent white projected from the predesegregation trend. Therefore, even assuming their desegregation projections are realistic, their plan only reduces racial imbalance by two percentage points and increases interracial contact by two percentage points.

[Table 4 about here]

Observation of other court approved voluntary desegregation plans indicates, however, that they experience white flight in anticipation of a future mandatory plan, since the court usually threatens such a plan if the school district does not achieve sufficient desegregation by voluntary means. Hence, columns 5 and 6 contain two estimates of the amount of interracial contact that

would be likely if the school district experienced the minimum amount of white flight (an additional school district loss of 2.5 percentage points) and the maximum amount of white flight (an additional 6 percentage points).[6] This reduces the level of interracial exposure slightly to 19.4 percent white in the average black child's school with maximum white flight.

These projections can then be compared to the Justice Department's (U.S.) plan under four assumptions: no white flight, minimal, mean, and maximum white flight. The plan, assuming no white flight (the original projections made by the plan's designer), would produce a level of interracial imbalance of 15.6, shown in column 7, which is reasonably close to perfect racial balance (0) given that most courts allow slight deviations for pedagogical and logistical reasons. The level of interracial exposure, shown in column 8, is 31.9 percent white in the average black child's school, almost twice that of the PAISD plan and close to the ceiling of 33 percent white in the school district.

The assumption of minimal white flight, shown in column 9, is defined as the withdrawal of one percent of the white students not reassigned out of their neighborhood school and 15 percent of those reassigned to black schools. After this loss is calculated for the affected schools, the extent of interracial exposure is 30.5 percent white in the average black child's school. Mean white flight, shown in column 10, is defined as the withdrawal of two percent of the white students not reassigned out of their neighborhood school and 33 percent of those reassigned to black schools.

This produces an interracial exposure of 28.7 percent white in the average black child's school. Maximum white flight, shown in column 11, is defined as the withdrawal of 5 percent of the white students not reassigned out of their neighborhood schools and 50 percent of those reassigned to black schools. This produces an interracial exposure of 26.5 percent white in the average black child's school.

This sensitivity analysis indicates that the U.S. plan with maximum white flight produces a level of interracial exposure 1 1/2 times greater than the PAISD plan with no white flight. Moreover, the experience of other central city school districts over 35 percent black indicates that the initial advantage enjoyed by the U.S. plan will continue for at least ten years. Assuming that a policymaker has the goal of maximizing interracial exposure and believes the estimates of minimum, mean, and maximum, and that the advantage of the U.S. plan will continue for at least a decade, this analysis gives the policymaker information by which to make a "rational" decision.

Summary

The central issue during the remedy stage of school desegregation court cases since 1975 has been the issue of white flight. The analyses presented by social scientists of the effect of school desegregation on white enrollment have been of limited use to policymakers because they predict only the costs of desegregation plans. In order to make a rational decision regarding which plan is best able to achieve school desegregation, policymakers need

information on the benefits of the plan. Traditional benefit-cost analysis, however, is of little use since the courts operate under the constraint of having to remedy unconstitutional segregation. In this situation, cost-effectiveness analysis can be used to determine which proposed plan maximizes school desegregation. If school desegregation is defined as interracial exposure, rather than simply racial balance, an index can estimate the level of interracial exposure expected for each plan after estimates of white flight have been made. A policymaker then has information by which to choose one desegregation plan over another.

Table 1

Estimates of San Diego's 1979 (T+2)
White Loss Rate with Various Desegregation Plans

	CHANGE		1979 TOTAL	
	Loss Rate	White Loss	White[a] Enroll.	% White
Predicted with no further desegregation[b]	-.048	-3414	67705	61.3
Predicted with same desegregation[c] expansion as last year (SDUSD)	-.060	-4267	66852	60.5
Predicted with extensive desegregation[d] (ACLU)	-.084	-5974	65145	57.7

[a]1978 white enrollment of 71,119 is the baseline.

[b]Includes all desegregation through 1978-79; Fall 1979 Db is .495.

[c]2.37% blacks reassigned; 51 percent whites reassigned; -.026 reduction in racial imbalance (Db); Fall 1979 Db is .469.

[d]25% blacks reassigned; 10% whites reassigned; -.300 reduction in racial imbalance (Db); Fall 1979 Db is .195.

Source: Declaration of Christine H. Rossell, Carlin v. San Diego Unified School District, 1979, p. 19.

Table 2

Cost-Effectiveness Ratios[a] of Desegregation Plans Proposed for the San Diego Unified School District

CE, No Further Desegregation	CE, School District Plan	CE, ACLU Plan
$\frac{0}{0} = 0$	$\frac{-.012}{-.027} = .44$	$\frac{-.036}{-.300} = .12$

[a]The cost-effectiveness ratio consists of the marginal loss rate due to desegregation in the numerator and the marginal decline in racial imbalance in the denominator.

Table 3

Estimates of San Diego's Interracial Exposure in 1982, 1983 with Various Desegregation Plans

	NET BENEFIT Sbw 1982, 1983
With Pre 1977 Desegregation Only	.252
With All Desegregation to Date (1978,79)	.270
With All Desegregation to Date Plus Same Expansion [a]Fall 1979 (SDUSD)	.27?
With All Desegregation to Date Plus Extensive Desegregation [b]Fall 1979 (ACLU)	.36(

[a] 2.37 % blacks reassigned; .51% whites reassigned; -.026 reduction in racial imbalance (Db); Db 1979 is .469.

[b] 25% blacks reassigned; 10% whites reassigned; -.300 reduction in racial imbalance (Db); Db 1979 is .195.

Source: Declaration of Christine H. Rossell, Carlin v. San Diego Unified School District, 1979, p. 25.

Table 4

A Comparison of the Net Benefit of the Port Arthur School Desegregation Plan and the United States Plan

PAISD Plan (1-12)						U.S. Desegregation Plan (1-12)				
		No White Flight		W/ White Flight		No White Flight		With White Flight		
1	2	3	4	5	6	7	8	9	10	11
1980				Min.	Max.			Minimum	Mean	Maximum
Db	Sbw	Db	Sbw	Sbw	Sbw	Db	Sbw	Sbw	Sbw	Sbw
65.9	17.9	63.7	19.9	19.7	19.4	15.6	31.9	30.5	28.7	26.5

Source: Government Exhibit 67, U.S. v. Texas Education Agency (Port Arthur Independent School District), et al., 1980.

Appendix 1

Second Post Implementation Year (T+2) Change Equation

$$\begin{aligned}\text{ZWE}\Delta = {} & -.0897 \underset{(.049)}{-.155}*(\text{Prop. Bl. T-1}) \underset{(.310)}{-.480}(\text{Unemp. T-1}) \underset{(.083)}{-.017}(\text{Crime}) \\ & \underset{(.021)}{-.011}(\text{So. City}) \underset{(.026)}{+.066}*(\text{S.D./SMSA Seg. Ratio}) \underset{(.009)}{+.010}\ (\text{Log}_{10}\ \text{Prop. Bl. Reass. T+0}) \\ & \underset{(.011)}{+.005}\ (\text{Log}_{10}\ \text{Prop. Bl. Reass. T+0}) \underset{(.011)}{+.009}\ (\text{Log}_{10}\ \text{Prop. Wh. Reass. T+0 x} \geq .35\ \text{Prop. Bl.}) \\ & \underset{(.020)}{-.014}\ (\text{Log}_{10}\ \text{Prop. Wh. Reass. T+1}) \underset{(.013)}{+.009}\ (\text{Log}_{10}\ \text{Prop. Bl. Reass. T+1}) \\ & \underset{(.024}{-.028}\ (\text{Log}_{10}\ \text{Prop. Wh. Reass. T+2}) \underset{(.013)}{+.004}\ (\text{Log}_{10}\ \text{Prop. Bl. Reass. T+2}) \\ & \underset{(.008)}{-.010}\ (\text{Log}_{10}\ \text{Prop. Wh. Reass. T+2 x} \geq .35\ \text{Prop. Black T+1})\end{aligned}$$

$r^2 = .53$

Standard error in prediction = $\pm$ .041

INTERRACIAL EXPOSURE EQUATION: City School Districts only (N=73)

$$\begin{aligned}\text{SbwT+3 (T+4)} = {} & .124 + \underset{(.116)}{.802}^{*}(\text{Prop.White}) + \underset{(.185)}{.031}(\text{Crime}) + \underset{(.979)}{.312}(\text{Aver. Unemp.}) \\ & \underset{(.086)}{+.037}(\text{So.City}) \underset{(.047)}{-.047}(\text{Log}_{10}\ \text{City Pop.}) \underset{(.070)}{-.036}\ (\text{Log}_{10}\ \text{Past Deseg.Reass.}) \\ & \underset{(.036)}{-.076}*(\text{Log}_{10}\ \text{Prop.Wh.Reass.T+0,T+1}) \underset{(.022)}{+.031}\ (\text{Log}_{10}\ \text{Prop.Bl. Reass. T+0, T+1}) \\ & \underset{(.130)}{-.381}*(\text{S.D./SMSA Seg. Ratio})\end{aligned}$$

$r^2 = .87$

standard error in prediction $\pm$.093

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*Significant at .05 or better.

NOTES

[1]Social science research should ideally have the same characteristics as other types of scientific research. These include 1) a control and experimental group, or variation across cases in cause and effect variables, 2) cases chosen for analysis on the basis of sampling theory, and 3) the rejection or acceptance of hypotheses according to statistical criteria.

[2]This is a crude criterion because it is dichotomous. The difference between an 89 percent black school and a 90 percent black school according to this criterion is that the black students in the former are in a "desegregated" school while those in the latter are in a "segregated" school.

[3]The most commonly used index of racial imbalance is the index of dissimilarity. The formula is

$$D = \tfrac{1}{2} \Sigma \left| \frac{Wi}{W} - \frac{Ni}{N} \right|$$

where W is the number of whites and N is the number of Negroes. This can be used to measure the segregation of any two groups from each other by substituting them for W and N. This measure represents the proportion (or percentage if multiplied by 100) of black students who would have to be reassigned to white schools, if no whites are reassigned, in order to have the same proportion in each school as in the whole school district. It is also the sum of 1) the proportion of black students who need to be reassigned to white schools and 2) the proportion of white students who need to be reassigned to black schools, in order to have the same proportion in each school as in the whole school district.(The specific proportions adding up to the index are a function of racial proportions and prior segregation and cannot be arbitrarily determined as some researchers have mistakenly believed.) The index ranges from 0 (perfect racial balance -- that is, no black students need to be reassigned) and 100 (perfect racial imbalance -- that is, 100 percent of the black students need to be reassigned, if no whites are reassigned, in order to have racial balance.

[4]This can be used to measure the exposure of any two groups to another by substituting them for blacks and whites in the equation. The proportion of any racial group in the average other-group child's school can be no higher than the proportion of that group in the school district. For example, the proportion white in the average black child's school can be no higher than the proportion white in the school system.

[5]See footnote 3 for the formula and explanation. If student reassignments are expressed in percentages, the index should also be expressed in percentages. If reassignments are completely

"rational" the percentage of black students reassigned and the percentage of white students reassigned should equal the reduction in racial imbalance. Here 2.37 + .51 = 2.89, not the 2.60 reduction in racial imbalance. This occurs because the projected reassignments are not perfect racial balance reassignments.

[6]This analysis was conducted by subtracting a constant number of whites from each school's projected enrollment so the total loss rate was an additional 2.5 percent in the one situation and 6 percent in the other. The Sbw was then calculated.

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